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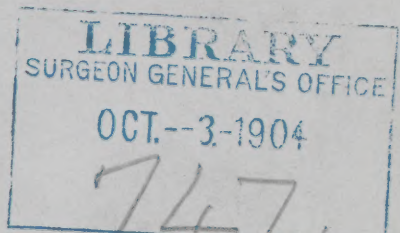
*Eversion or Turning Inside Out of the
Sac of a Cystonephrosis as an Aid in
Operating Upon the Renal End
of the Ureter and Upon the
Partition Walls Between
Dilated Calices.*

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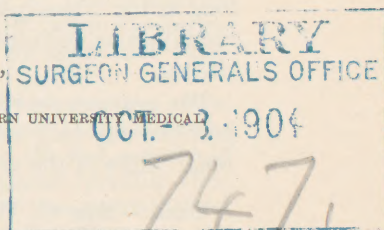
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EVERSION OR TURNING INSIDE OUT OF THE SAC OF A CYSTONEPHROSIS AS AN AID IN OPERATING UPON THE RENAL END OF THE URETER AND UPON THE PARTITION WALLS BETWEEN DILATED CALICES.

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I DESIRE to describe a new method of systematic search for the ureteral opening on the inside of a cystonephrotic sac; not by "bisection," as I have described in the case of infected partial cystonephrosis,¹ but by eversion of the cystonephrotic sac through an opening large enough to permit of turning the wall inside out. This eversion of the cystonephrotic sac, combined with methodical consecutive division of the partition walls one after another, enables us gradually to lay bare and turn out for ocular inspection the whole inner wall of the sac. This is also a sure way of finding the renal orifice of the ureter. The division of the partition walls transforms the multilocular into a unilocular cavity, and facilitates drainage of urine down the ureter into the bladder.

This methodical eversion of the sac is new and superior to the method employed by Simon and, later, by myself, of inspecting the inner wall of the sac *in situ* through the opening in its wall by means of specula and reflected sun- or lamplight. This method also makes it much easier to find the ureteral orifice. I cannot see how the renal orifice of the ureter can escape being seen by this method. However, if it is nearly obliterated by stenosis from infection or inflammation, it might be impossible to see it even under these circumstances, and it might, therefore, become necessary to lay the ureter bare from below and outside of the sac, open the ureter by a small longitudinal incision, and pass a fine probe up into the sac as described by me in a former paper.²

Another advantage of the method of eversion is the ease and promptness with which the ureteral orifice is brought into the field of operation. We do not need to wait three months or more for retraction of the sac, and then bisect the kidney in order to find and operate on the

¹ Annals of Surgery, June, 1896.

² Journal of the American Medical Association, March 10, 1894.

ureteral entrance from within, but can accomplish all that is required in a single operation.

I do not, of course, know in what proportion of cases a cystonephrotic sac is so movable and so easy to handle that this eversion is feasible, but I think it likely that it would be the rule in cystonephrosis following or caused by a descended floating kidney, and would be the case as long as the cystonephrosis was aseptic—that is, not yet fixed to its surroundings by perinephritic inflammation from the infected contents of the sac.

The eversion proved in the following case to be a great help, and was probably the only means possible of finding and operating upon the renal orifice of the ureter.

CASE.—Miss C. W. was referred to me by Dr. J. V. Bacon for operation on February 21, 1898, and entered Passavant Memorial Hospital in my service. The patient was twenty-three years of age, American, single.

Family history: Negative, with the exception that her father passed stones with the urine thirteen years ago.

Personal history: Patient had the ordinary diseases of childhood, and, in addition, dysentery at the age of three years, and typhoid fever at the age of fourteen, complicated by hemorrhage from the bowels. At the ages of seven and twenty years she had attacks of jaundice, with nausea and vomiting, attended by slight elevation of temperature, but without pain in the epigastrium or the region of the gall-bladder. No clay-colored stools nor stones in the feces were observed. The second attack, in 1895, was characterized by a gradual onset of jaundice for a month, at which time she was most deeply jaundiced. This attack was attended by nausea and vomiting after all meals, and occasional nausea between meals. She was able to retain food by drinking lemon phosphate, obtaining in this way relief from the nausea. The jaundice and nausea continued until the spring of 1896. She lost some weight, but does not know how much. Since the spring of 1896 she has had no further nausea, jaundice, or other symptoms pointing to the biliary tract.

She had prolapse of the uterus at the age of fourteen, which continues to the present time. She gives no history of injury.

Present illness: In July, 1893, while at the World's Fair, the patient was seized with pain in the right mammary line an inch and a half below the costal arch. This pain came on very suddenly, was sharp, constant, and severe, and localized to an area the size of a silver dollar, and without radiations. Flexion of the right thigh caused the pain to increase in severity. She had no urinary disturbance at this time. Upon going to bed she found that while the pain lasted she could not lie on the left side, and that there was much tenderness on pressure over the painful territory, which did not alter upon change of posture from standing to lying down. There was no tenderness on pressure beyond the area of pain. After fifteen to thirty minutes in the recumbent posture she was entirely free from pain. During, before, or after the attack she does not think she had any chill or elevation of temperature. She perspired freely and felt faint during the attack.

For the two years following she had similar attacks varying in fre-

quency from one in seven to fourteen days to several a day. Very soon after the first attack she noticed that certain bodily movements, such as elevation of the right arm above the head, flexion of the trunk to the left, or any movement that produced extension of the muscles on the right side brought on the pain. Most of the time she was forced to sleep with the right thigh semiflexed. Extension apparently caused a feeling of tension on the right side of the abdomen, and was followed by an attack. She found that lying down for fifteen or twenty minutes would give her relief from the attacks. By going to bed in the beginning of the attacks she was able to abort them or cut short their duration.

During or preceding attacks she had no unusual desire to pass urine, but a month or two after the first attack she noticed that about the time the pain subsided, or a few minutes thereafter, she had a desire to urinate and passed from two to four ounces, a smaller quantity than she ordinarily passed when feeling well. The urine was never stained with blood, nor did it contain any foreign matter that attracted any attention. During these two years she lost considerably in weight and became very pale and thin. She was not as strong as before, although she continued her work as a saleswoman.

In the autumn of 1895 she first noticed a tumor in the right side about two inches in diameter, not tender to pressure, and of firm consistency, located just beneath the tender area above referred to. The tumor seemed to make traction on this tender area, and she says it "felt as hard as a stone." It was at first spherical, barely noticeable when erect, and apparent only when the patient assumed a recumbent posture. She could not feel or see it at first when sitting or standing. The tumor was not noticeable at all times, but in about ten or fifteen minutes, after she made some movement which would bring on an attack of pain she would notice the swelling, which would gradually enlarge.

From this time on, and during 1896, the tumor increased in size in all directions, but principally downward. By the end of the latter year the tumor extended from one inch below the costal arch in the mammary line about three inches downward. As the tumor increased in size the attacks became progressively less painful up to September, 1897. At that time the tumor extended from the costal arch to one or two inches above the crest of the ileum. She could now place her hand beneath the tumor and lift it up; she could also outline it all around except posteriorly.

In 1897 she noticed that the tumor was constantly present, but varied greatly in size. She also observed that as time went on it required a longer time for the tumor to empty itself, and that it was more resistant. At such times it showed no tendency to decrease when she lay down, and it was necessary to use massage and pressure to bring this about. It usually required about three hours to accomplish this, and even then the contents of the tumor were not completely evacuated.

Throughout 1897, and until the present time, pressure upon the tumor causes her to have a desire to pass water, and she apparently evacuates the bladder; and, if pressure is continued, she has another evacuation in from fifteen to forty-five minutes, this being repeated until the tumor becomes collapsed.

At this time the tumor extends from the costal arch to the brim of the pelvis and Poupart's ligament, and from the median line in front

to the scapular line posteriorly. (Fig. 1.) These boundaries are constant. The tumor varies in consistency, is fluctuating, and feels soft.

Its contour is regular, and it is not tender to pressure. For two months preceding the examination it has not been painful except in the original area of tenderness, where there is an almost constant feeling of soreness.

FIG. 1.



The tumor causes her no discomfort excepting when it is much distended; at such times she notices abdominal distention and a feeling of weight in the middle of the tumor. So far as she knows, she has never passed blood or other foreign matter in the urine; but is said to have had intermittent slight albuminuria.

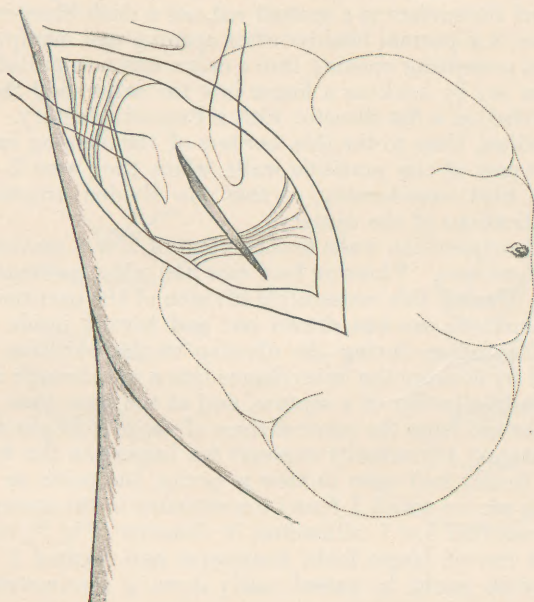
She feels well at present.

Operation: February 22, 1898, in the presence of the doctors from the Polyclinic, and assisted by Drs. Hessert, Buford, Waters, Doepfner, and Gillett, under ether narcosis I made cystoscopy with Kelly's instrument, the patient being in the knee-chest position. The bladder was normal; the left ureter could not be found; the right ureter was normal, and an elastic catheter was easily inserted 35 or 36 centimetres. No urine escaped, and the catheter could not be passed higher. I thought that this probably meant a bend in the ureter close to and below the pelvis of the kidney, or, rather, the cystonephrotic sac. As I could see no urine dribbling down when the elastic catheter was in the ureter, into which it had passed easily, I was afraid that I might have made a mistake, and therefore reintroduced Kelly's tube that I might see the catheter in the ureter. I then saw that the catheter was in the ureter, but that there was some bleeding at the ureteral orifice.

The patient was now turned on the left side with a pillow under the left hip. An oblique incision, 10 to 12 centimetres long, was made parallel to the twelfth rib from the erector spinæ. The latissimus dorsi was pulled aside or divided, and the quadratus lumborum divided. There was little perirenal fat. Respiratory movements could be observed through the transversalis fascia. The adipose capsule was a loose connective-tissue mass, containing little or no fat. It was so movable against the kidney that I took it to be the peritoneal cavity.

The surface of the kidney was globular and sacculated. It presented an elastic sac with a smooth, reddish or bluish-gray surface, resembling the color of kidney substance. In the wound a globular surface presented 5 or 6 centimetres in diameter. This was the top of the kidney located below the twelfth rib. It was consequently a floating kidney displaced downward. Below this surface was an annular depression corresponding to a partition wall of inter-pyramidal substance, and then a larger globular prominence below. Other less marked globular prominences corresponding to calyces were felt in the abdomen toward the median line. The sacs averaged 6 to 8 centimetres in diameter.

FIG. 2.



After packing sterile gauze around the borders of the sac the upper globular portion of the sac was fixed with two loops of heavy silk. (Fig. 2.) A perfectly limpid, clear, thin, transparent, light yellow fluid spurted from the stitch-holes. Dr. Brougham made cultures from this fluid.

I now incised the sac for a distance of 2 centimetres between the sutures. Hemorrhage followed the incision, which was so profuse that the yellowish, clear fluid became bloody. About a quart of the fluid was caught in a basin. The fluid was too transparent to contain any cells—that is, it was an aseptic cystonephrosis.

I now searched for the ureter inside of the sac. As the sac extended downward so as to fill the whole of the large pelvis the ureter was not sought for outside of the sac. In another case I might, however, do this after having found the ureter inside and passed a catheter down.

The incision was now prolonged downward for a distance of 6 or 8 centimetres. The wall of the sac was 3 millimetres thick. There was profuse hemorrhage from small vessels all over the wall, and from

spurting arteries, especially at the location of the partition walls. I concluded that this vascularity was due to the presence of a good deal of secreting kidney substance. A small piece of this tissue was cut out for microscopical examination. The hemorrhage was stopped by Paquelin cautery, but the spurting arteries in the partition walls began to bleed again after the territory had been manipulated later on in the operation. This required the reapplication of the cautery three or four times in the course of the operation.

The inside of the cystonephrotic sac was sacculated; a narrow opening $1\frac{1}{2}$ centimetres in diameter led into a sac 4 to 7 centimetres in diameter; the inner surface was smooth, shining, reddish-white, and looked like a smooth mucous or serous surface. After an hour multiple small ecchymoses changed the surface to a spotted red, not a dark blood-red, exactly as I have seen in a normal bladder after opening and manipulation.

The nearest presenting opening into a calyx was now pulled out of the incision in the sac by hooking a finger into the calyx, and the partition wall was divided on a flat director with a Paquelin cautery. The division was bloodless, close to the thin borders of the opening into the sac, but the outer part of the partition walls, where they were 2 or 3 millimetres thick, bled considerably, so that the divided arteries required repeated applications of the cautery.

I divided four partition walls to the extent of 2 or 3 centimetres, thus laying open four sacs. Three or four sacs had wide openings, and were not divided. During this consecutive division of the partition walls the entire cystonephrotic sac was drawn out and turned inside out. This and the manipulation during the division of the partition walls were accomplished by hooking the index-finger into a sac through an opening or around the free border of a septum, and at the same time pushing in the wall of the sac from the outer surface of the cystonephrotic sac.

In this manner I gradually exposed for inspection the whole inner surface, and finally laid open to view a cavity, the pelvis or the pelvic portion of the sac, on which I found the entrance to the ureter as a semilunar transverse fold 5 to 7 millimetres in diameter (Fig. 3), below which I could see a row of larger folds, transverse and located 1 centimetre apart. A probe could be passed easily down 2 centimetres into the ureter.

Examination of the ureter. A long metal sound was passed down 24 centimetres, as I supposed into the bladder, but in order to make sure I passed a steel sound into the bladder through the urethra. I could not feel the click, however, the sounds did not meet, nor could they be felt by Dr. Bacon's finger in the vagina. The sound in the bladder appeared to be separated from the probe in the ureter by a soft wall. As I thought the probe might be too short, I passed a long, flexible catheter down through the ureter, expecting to see it in the bladder through the Kelly speculum. I could feel the end of the flexible catheter from the vagina. I could feel it move, but the movement was not free, as it would have been had it been in the bladder. It felt rather as if it was in the wall of the bladder, but was arrested in the portion of the ureter which passes through the wall of the bladder. I could feel no stone at the end of the catheter, and with the speculum I could not see the catheter in the bladder. The flexible catheter was now withdrawn; the attempt at withdrawal met with resistance, as if the catheter were caught low down in the ureter near or in the bladder wall.

I now operated for the relief of the valve formation from the lateral implantation of the ureter in the pelvis. The pelvis was made tense by a finger of the left hand in the nearest calyx, and a flexible bougie passed down and into the ureter (see Fig. 4), which was then divided, together with the covering sac-wall, with scissors for a distance of 2 centimetres. The wall of the pelvis was grayish, 1 to 1½ millimetres thick, with loose connective tissue connected with the ureter, and consequently movable over it. The wall of the ureter was much thinner, probably $\frac{1}{2}$ to $\frac{3}{4}$ of a millimetre thick. The wall of the divided ureter was united with the divided wall of the pelvis by a continuous catgut suture (Figs. 5 and 6).

FIG. 3.

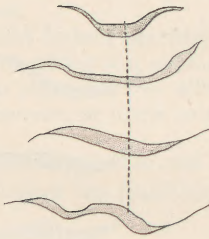
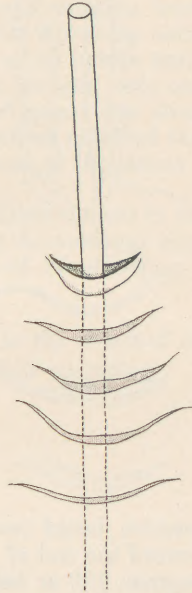


FIG. 4.



A long, flexible catheter was passed down 24 centimetres or more, when it met with a soft resistance, and when withdrawn was held at this point by something which it pulled upon when the attempt at withdrawal was made. This resistance was overcome with a sudden jerk low down in the ureter, above which place the catheter moved easily. Dr. Buford noticed that the withdrawal of the catheter was followed by a welling up of blood from the ureter, but I am not sure that this blood had not run down from the bleeding surfaces in the cystonephrotic sac.

A bougie was now passed down 20 centimetres and left permanently in the ureter.

The everted cystonephrotic sac was inverted and replaced, after final stoppage of the hemorrhage from the partition walls with the Paquelin cautery.

The opening in the cystonephrotic sac was sutured to the skin by eight silk sutures.

After uniting the quadratus lumborum with a buried mattress-suture, a part of the posterior and anterior borders of the wound was united.

A large rubber drain was passed inside of the cystonephrotic sac down to the bottom, and the sac was loosely packed with sterile gauze around the drain. Gauze drains were packed around the outside of the sac between the latter and the abdominal wall.

FIG. 5.

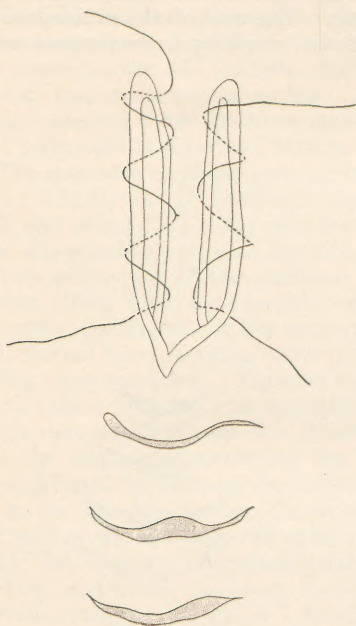
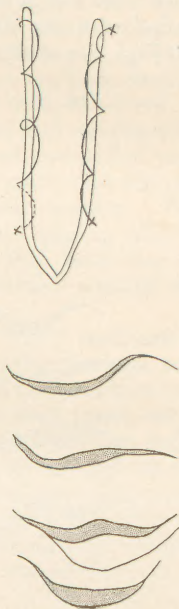


FIG. 6.



The operation lasted two hours and a half; the loss of blood was slight. Toward the end of the operation the pulse became weaker, but not too frequent, 100 or below. Hypodermatic injections of camphorated oil and strychnine were made.

Examination of the fluid from the tumor. The tumor contained about 1200 cubic centimetres of fluid, which was limpid and transparent, distinctly acid, and had a specific gravity of 1013. It contained 36 grammes of solids, about one-half the normal amount; 4.8 grammes of urea, about one-fifth the normal amount; 7.8 grammes of chloride, one-half the normal amount. Phosphates, sugar, bile, and indican were absent, and sulphates present.

After-treatment. The first twenty-four hours after the operation the quantity of urine was much less than normal. This was followed by a rapid increase, which on the third day exceeded the normal amount, and on the sixth day amounted to 149 ounces. During this rapidly increasing secretion of urine the patient was extremely nervous and slept very little, although for the first few days, when the urine was fairly normal, the nervousness was not so marked. During this period of polyuria the patient drank large quantities of water both day and night, the quantity corresponding fairly well with the amount excreted.

The patient constantly complained of thirst, and especially of dryness in the throat; no especial symptoms referable to the kidney were observed, and the only inconvenience was the frequent desire to empty the bladder.

On the tenth day a solution of pyoktanin was injected into the kidney, the openings carefully closed, and the patient instructed to lie on the opposite side for one or two hours. The solution did not appear in the urine, however. A week later, before the daily irrigation, the patient passed seven and one-half ounces of urine of normal color. Immediately after the irrigation, twelve ounces of perfectly clear fluid was withdrawn from the bladder. Pyoktanin was again used two and four days after the first employment, but still with negative results. The increased quantity of urine passed was not in any way dependent upon the filling up of the bladder by the boric-acid solution used for irrigating the wound, as there was no appreciable difference noticed in the quantity of urine passed within the same period before and after the irrigation. The ureter was demonstrated to be open only once, on the seventeenth day, when the quantity of urine passed was about normal. As the restlessness and nervousness of the patient subsided the quantity of urine decreased, and the thirst and dryness of the throat gradually diminished.

The right kidney secreted from three to eleven ounces in the twenty-four hours, which was estimated by weighing the dressings when applied and when removed, the difference in weight of the dressings representing the amount of urine excreted.

The outcome of this case is not material, as the object of this report is only to show the feasibility of this method of operating.

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